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Meeting of the Parties to the Protocol on Pollutant Release and Transfer Registers to the Convention on Access to Information, Public Participation in Decision-making and Access to Justice in Environmental Matters

Working Group of the Parties

First meeting
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Item 1 of the provisional agenda
Training on a cost model to support implementation of the Protocol on Pollutant Release and Transfer Registers

Cost model for the establishment of Pollutant Release and Transfer Registers

Summary

This document was prepared pursuant to the decision of the Meeting of the Parties to the Protocol on Pollutant Release and Transfer Registers at its first session (Geneva, 20–22 April 2010) (ECE/MP.PRTR/2010/2, para. 47) and the first meeting of the Bureau to the Meeting of the Parties.[1]

[1] Bureau report, para. 38. A copy of the Bureau report is available at: http://live.unece.org/fileadmin/DAM/env/pp/PRTR%20Bureau/PRTRPB-1st_%20meeting_report.pdf.

I. Introduction

1. Despite a number of intergovernmental recommendations to collect information on the costs of implementing Pollutant Release and Transfer Registers (PRTRs), in practice, surprisingly little research effort so far has gone into developing detailed cost estimates. Only a handful of studies exist that provide estimates of the costs of PRTR reporting and these either have a relatively narrow focus or represent very rough estimates.

2. The main objective of the project on developing a cost model — a tool to assess the cost involved in the implementation of the Protocol on Pollutant Release and Transfer Registers (Protocol on PRTRs) to the Convention on Access to Information, Public Participation in Decision-making and Access to Justice in Environmental Matters (Aarhus Convention) — was to redress this omission by developing detailed estimates of the magnitude of costs of monitoring emissions (releases) of substances, contained in the annex to the Protocol, to different environmental media (air, water and land) in order to assist Parties to the Protocol with its implementation. This could also aid countries considering accession to the Protocol to rapidly evaluate the costs of their potential obligations, thereby potentially speeding up the take-up and diffusion of PRTR systems around the world. The cost information collected also has wider applications related to the quantification of greenhouse gas (GHG) emissions, a central issue within the ongoing global developments to mitigate climate change.

3. The model built for this project is a financial model which attempts to capture the main costs to the private sector of the relevant emissions monitoring, whether through measurement, calculation or estimation, to air, water and land. The model was estimated with data from the field trips to Norway, Sweden, Switzerland and France. Data was collected on the basis of a facility questionnaire. As expected, these field trips were successful in securing fully completed questionnaire data and in gaining an improved understanding of the context of environmental reporting in all countries.

II. Main results

4. Altogether, the sample sizes, on a per substance basis, were very high for air and for water (namely 299 for air and 181 for water). Visits were undertaken to 48 facilities, across a wide array of industries as shown in the table below.

Industry	*Percentage*
Energy	7
Production and processing of metals	17
Mineral	10
Chemical	28
Waste management	14
Paper and wood production and processing	3
Animal and vegetable products from the food and beverage sector	7
Other: plants for pretreatment or dyeing of fibres or textiles	3
Other: installations for the surface treatment of substances, objects or products using organic solvents	7
Other: installations for the building of, and painting or removal of paint from ships	3

5. The substances are divided into five groups according to their chemical properties. We will refer to them as follows: Group A (substances 1–16), Group B (metals, substances 17–24), Group C (dioxins and polychlorinated biphenyls (PCBs), substances 25–60), Group D (substances 61–78) and Group E (substances 79–86).

6. In the case of air, average sample size per substance was 4.9 (9.1 for positive values only), ranging from 0 to 28 (for nitrogen oxide) (figure 1 below). In the case of water, average sample size per substance was 3.1 (6.9 for positive values only), ranging from 0 to 18 (for total organic carbon) (figure 2 below). The sample provided coverage for air of 54 per cent of eligible substances, and 45 per cent in the case of water. This makes clear that although the Protocol on PRTRs substance list appears to be large, in practice, only about half of all the applicable substances per medium are actually widely monitored across the industries with legal obligations to report.

Figure 1
Sample size for releases to air

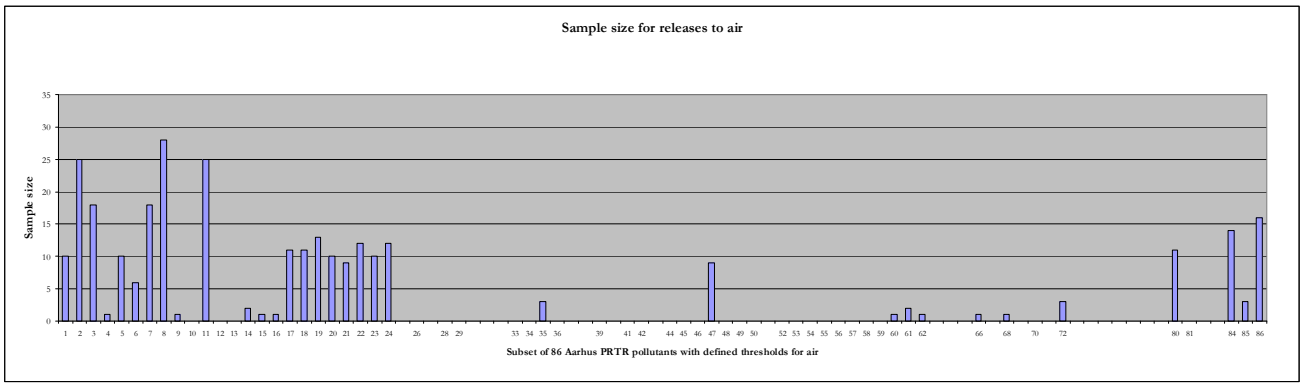
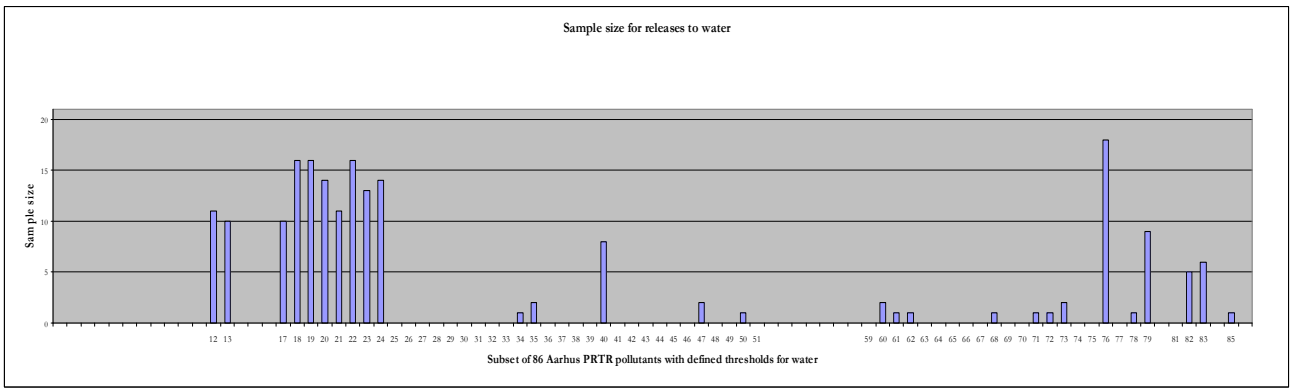


Figure 2
Sample size for releases to water



7. The monitoring of emissions can either be outsourced to an independent contractor or undertaken in-house by the environmental testing unit within an enterprise. The costs of outsourcing the analysis for air and for water are graphed in the following charts (figures 3 and 4).

Figure 3

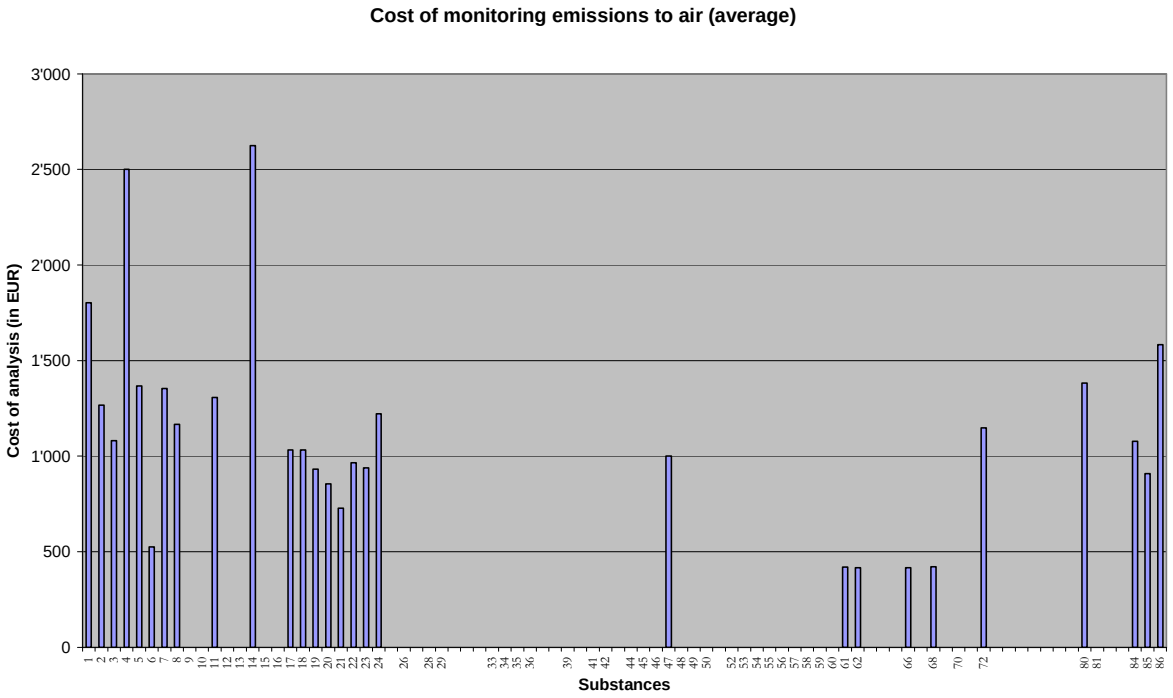
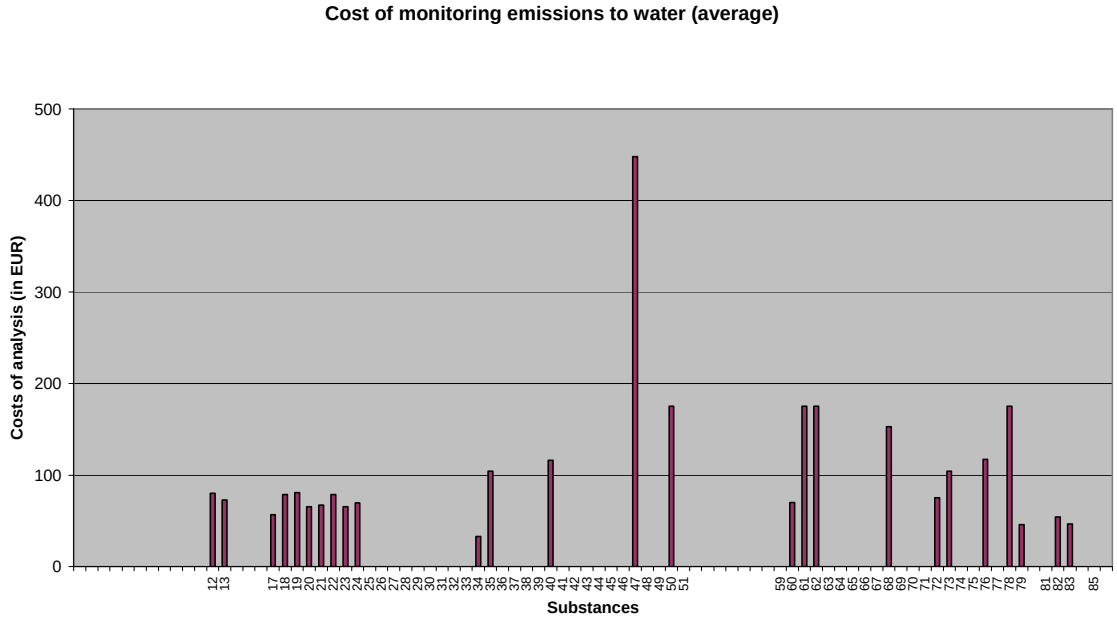


Figure 4



8. The results show that outsourcing the monitoring of emissions to air is considerably more costly (on average, €1,133) than outsourcing the monitoring of emissions to water (on average, €84), namely by a factor of over 13.

9. At an average of €1,305 for air, Group A substances are the most costly to monitor via outsourcing of the five chemical groups. This is followed by Group E at €1,296, Group C (dioxins and PCBs) at €1,000, Group B (metals) at €970 and, finally, Group D at €627, on average. The costliest in Group A are hydrochlorofluorocarbons (HCFCs) and hydrofluorocarbons (HFCs), at €2,500 and above. It should also be noted that the vast majority of monitoring emissions to air in this large sample is undertaken for Groups A and B substances, namely 78 per cent. The least costly to outsource among the pollutants to air are Group D substances, anthracene, benzene, ethylene oxide and naphthalene.

10. In the case of outsourced monitoring of emissions to water, the costliest pollutants to monitor (on average within group) are those in Group C (€193), followed by Group D (€137), while the other groups are inexpensive to monitor (between €58 and €78). The most common substances that are outsourced are the metals (Group B) and parts of Group A. Together, these two groups account for 63 per cent of the sample.

11. The facilities visited also performed in-house analyses to monitor their emissions to both air and water. For this purpose, they can use either measurements, calculations or estimates.

12. Regarding measurements, an infrared system can be used to monitor the main GHG pollutants and other pollutants of Group A substances (methane (CH_4), carbon monoxide (CO), carbon dioxide (CO_2), nitrous oxide (N_2O), ammonia (NH_3), non-methane volatile organic compounds, nitrogen oxides (NO_x), sulphur oxide (SO_x), halons), a few of the Group C substances (dichloromethane, vinyl chloride) and some of those that make up Group E (hydrogen chloride (HCl), hydrogen fluoride (HF) and coarse particulate matter (PM_{10})). This tool is very expensive: its price ranges from about €100,000 to €250,000 (the most complex one may even cost more than €800,000). Its estimated lifespan is 10 to 15 years and its maintenance cost, including supplies, is about 10 to 20 per cent of its purchase price.

13. For in-housed analyses to control emissions to water, facilities tend to use only measurements, not calculations or estimation techniques. One of the most frequently used tools is a spectrophotometer (under ultraviolet or Infra-red or by atomic absorption). This is a bottle-like container that fills up depending on the substance flow. Daily samples are collected. This tool may be used to monitor water emissions of metals, phenols, total organic carbon (TOC), hydrogen cyanide, cyanide and fluorine. Its purchase price ranges from €5,000 to €8,000, with an expected life duration of 10 to 15 years.

14. In the case of Norway and Sweden, most facilities often did not use standardized (International Organization for Standardization (ISO)) techniques to make their environmental reporting determinations, and instead relied heavily on calculations or estimations. Second, most facilities relied on outsourcing as well as in-house analysis to make their determinations and, for both of these, grouping of compounds with similar properties for analytical purposes was very much the norm. Third, large differences in the results were noted based on whether facilities had automatic or manual sampling and, if the latter, then facility size became an important consideration. Finally, these visits reinforced the impression that environmental reporting imposes a significant burden on facilities, almost regardless of operating activity.

15. In France, much less in-house analysis was performed. The norm was to outsource all testing of emissions to accredited institutions for a variety of reasons. First, the equipment costs can be quite substantial as described above. Second, enterprises typically do not have sufficient volume to justify these expenses and find it more cost-effective to

use external laboratories. Third, the national certification procedure for environmental monitoring is too burdensome for enterprises to directly comply with. Fourth, the requirements and technology are constantly changing and it is difficult for enterprises to remain fully abreast of the newest developments. Finally, enterprises often do not have the specific human capital expertise required to undertake all the testing.

16. The frequency with which enterprises have to report the results of the emissions monitoring exercise to the authorities is dictated by a number of factors and fixed by their industrial operating permit (under the European Union's Integrated Pollution Prevention and Control (IPPC) process). These factors include the nature of the substances released, how close they are to the emissions limits set by the regulatory authorities and the environment and geographical location the enterprise operates in. For water, frequency can range from monthly (e.g., for TOC), to biannually (e.g., for heavy metals), to annually (for dioxins, furans, and adsorbable organic halogen) for the different substances. For emissions to air, many substances, such as CO, HCl, SO_x/sulphur dioxide, NO_x, HF, cadmium, mercury and metals, the periodicity of monitoring can also be once a trimester. This information is then also used to fulfil the annual reporting requirement under the national PRTR (GEREP system). It is therefore clear that the parameters for most emissions monitoring in France is dictated by the terms of the licence, while the annual reporting under the PRTR can be viewed as a by-product of this process, which does not really impose additional costs on enterprises.

III. Further research

17. One of the main avenues of future research is to better understand how enterprises make the decision to invest in technologies that curtail pollutants and the role that the public and civil society plays in influencing this outcome. In addition, an area of considerable interest is the cost of estimating anthropogenic GHG emissions and setting up GHG inventories. There is also a good case for studying how to best harmonize reporting procedures at the national level, to better combine reporting mandated by both national and international legal instruments, for example, under various multilateral environmental agreements, national licensing requirements, or obligations that pertain to a specific region within a country, in order to reap substantial efficiency gains.

IV. Final remarks

18. Due to the value of such visits for the overall understanding of how our legal instruments are applied in practice, such visits — wherever possible — should be encouraged. These visits have greatly helped to take into account real concerns and constraints on the ground. Second, there is a great deal of interest in this project and in the United Nations Economic Commission for Europe’s work at the facility level and an extra effort should be made to disseminate the project’s findings to the facility level. Finally, it is difficult to extricate reporting under a PRTR from reporting under national regulatory obligations in connection with operating licences. Mostly, reporting on PRTRs is part of a wider system of enterprise environmental management, which helps to better control emissions, reduce wastes and increase recycling, thereby saving the enterprise a lot of money.